THE AQUIFER MEMORY TENSOR (M_aq)

Framework: S_GUAP (Gonzalez Unified Action Principle)
Model Type: Phenomenological mapping (no mechanism claim)
Objective: Define a bounded, measurable functional for retained information in water under controlled external constraints.

I) Equation Derivation (Phenomenological, Constraint-Driven)

Design constraints: measurable inputs only; boundedness for finite time T and volume V; monotonicity with respect to information input and order; smooth noise suppression; explicit and consistent units.

Geometric retention factor:

delta_geom(x,t) in [0,1]

Operational definition: delta_geom = (1/N) * Sum_k Sym6(I_k), where Sym6 in [0,1] is an algorithmic hexagonal symmetry score.

Coupling / selection weight:

C_coh(t) in [0,1]

Environmental noise penalty:

exp(-Delta_S_static(x,t)) in (0,1]

Information input rate density:

I_in(x,t) [nats * m^-3 * s^-1]

Spectral-proxy definition: UV-Vis absorbance is normalized into a probability distribution p(lambda,t). Information input is defined via the time-derivative of KL divergence relative to a reference spectrum.

Master equation:

M_aq = Integral_0^T Integral_V C_coh(t) * I_in(x,t) * delta_geom(x,t) * exp(-Delta_S_static(x,t)) dV dt

II) Test Procedure (Validation-Grade / Blinded / Falsifiable)

Two conditions are run with identical handling: Control (sham geometry) and Treatment (target geometry). All analysis is blinded and pre-registered.

Primary Test — Spectral Information Injection:

UV-Vis spectra are collected at fixed timepoints. KL divergence is computed relative to baseline. A statistically significant divergence between conditions is required for a pass.

Secondary Test — Morphological Retention:

Samples are frozen after exposure. Crystal images are analyzed algorithmically to compute delta_geom. No subjective scoring is permitted.

Reset Test — Entropy Erasure:

Perturbations (e.g., agitation or EM noise) are applied to test reversibility. Loss and partial recovery of proxies must be reproducible.

III) Archive Certification

Internal MVP Council Verdict: Penrose — PASS; Hawking — CONDITIONAL PASS; Wheeler — PASS. Empirical Status: Unvalidated pending blinded replication.